

CLAIMS

What is claimed is:

1. A female coupler, comprising:

a generally tubular exterior portion, having an internal bore with an open forward end adapted to receive a male coupler, a flow port for supplying pressurized fluid to the internal bore, an internal surface with at least one groove section, and at least one outlet passage through said exterior portion fluidly communicating with said at least one groove section;

a generally tubular interior portion, disposed within said internal bore and axially movable within said exterior portion from a first position, in which fluid is sealed between said exterior portion and said interior portion, and a second position, in which fluid can pass between said exterior portion and said interior portion as well as through said at least one outlet passage, said interior portion including a main cavity, opening towards said exterior portion forward end, and an internal valve seat;

a tubular sleeve disposed within said interior portion and being axially movable, relative to said interior portion, from a locked position to an unlocked position with said interior portion, said sleeve having an internal bore with an open forward end; and

a generally tubular poppet valve slidably guided within said sleeve internal bore and spring-biased forwardly against said valve seat to normally prevent fluid flow through said interior portion, said poppet valve including a valve seal portion, a forward projection, adapted to engage a check valve in said male coupler when said male coupler is received in said housing, and a rearward tubular portion, encapsulated within said sleeve, having an external diameter slightly less than said sleeve internal diameter.

2. The female coupler as in claim 1 wherein, when said interior portion is in said second position, fluid passing through said at least one outlet passage returns to a holding tank.

1 3. A female coupler, comprising:

2 an exterior portion having an internal bore with an open forward end adapted to
3 receive a male coupler, a flow port for supplying pressurized fluid to the internal bore, an
4 internal surface with at least one groove section, and at least one outlet passage through
5 said exterior portion fluidly communicating with said at least one groove section;

6 an interior portion including a main cavity opening towards said exterior portion
7 forward end, a circumferential groove for receiving a first peripheral seal positioned on
8 the external surface of said interior portion, and an interior valve seat, said interior
9 portion being disposed within said internal bore and axially movable within said exterior
10 portion from a first position, in which said seal contacts an internal, non-grooved internal
11 bore portion of said exterior portion, and a second position in which said seal is
12 adjacently contacting said at least one groove section within said exterior portion; and

13 a poppet valve slidably guided within said interior portion and spring-biased
14 forwardly against said interior valve seat of said interior portion to normally prevent fluid
15 flow through said internal body, said poppet valve including a valve seal portion, a
16 forward projection adapted to engage a check valve in said male coupler when said male
17 coupler is received in said exterior portion, and a rearward tubular portion.

1 4. The female coupler as in claim 3, further comprising a sleeve, having an internal
2 bore with an open forward end, disposed between said interior portion and said poppet
3 valve, and being axially movable relative to said interior portion and said poppet valve
4 from a locked position to an unlocked position with said interior portion.

1 5. The female coupler as in claim 4 wherein said poppet valve tubular portion is
2 nested within said sleeve and has an outside diameter generally similar to that of the
3 inside diameter of said sleeve.

1 6. The female coupler as in claim 3 wherein said interior portion is balanced and
2 comprised of a seal gland and a body, said first peripheral seal resides in an external
3 groove in a frontal surface of said seal gland, with a second peripheral seal residing in a

4 circumferential groove in said seal gland external surface and a third peripheral seal
5 residing in a groove in said exterior portion internal surface.

1 7. A female coupler, comprising:

2 an exterior portion having an internal bore with an open forward end adapted to
3 receive a male coupler, a flow port for supplying pressurized fluid to the internal bore, an
4 internal surface with at least one groove section, and at least one outlet passage through
5 said exterior portion fluidly communicating with said at least one groove section;

6 an interior portion including a main cavity opening towards said exterior portion
7 forward end, a circumferential groove for receiving a seal positioned on the external
8 surface of said interior portion and an interior valve seat, said interior portion being
9 disposed within said exterior portion bore and axially movable within said exterior
10 portion from a first position, in which said seal is axially spaced from said at least one
11 groove in said exterior portion, and a second position in which said seal is axially aligned
12 with said at least one groove section within said exterior portion;

13 a poppet valve slidably received within said interior portion and spring-biased
14 forwardly against said interior valve seat of said exterior portion to normally prevent fluid
15 flow through said interior portion, said poppet valve including a main cavity, opening
16 towards said exterior portion forward end, a valve seal portion, a forward projection,
17 adapted to engage a check valve in said male coupler when said male coupler is received
18 in said exterior portion, and a rearward tubular portion; and

19 a pressure relief valve fixedly positioned within said poppet valve main cavity
20 having a pressure relief pin located at the front axial end of said relief valve, adapted to
21 contact said male coupler check valve and relieve pressure within said female coupler
22 when said interior portion is in said first position and prior to said forward projection
23 engagement with said male coupler.

1 8. The female coupler as in claim 7 wherein said relief valve further includes a valve
2 body having an internal cavity that houses a spool with an external circumferential groove

3 for receiving a balanced seal that prevents the escape of fluid from said female coupler
4 prior to said pin contacting said male coupler check valve.

1 9. A female coupler for use as a fluid connector, comprising:

2 an exterior portion having an internal bore with an open forward end adapted to
3 receive a male coupler, a flow port for supplying pressurized fluid to the internal bore, an
4 internal surface with at least one groove section and at least one outlet passage through
5 said exterior portion fluidly communicating with said at least one groove section;

6 an interior portion disposed within said housing bore and axially movable within
7 said exterior portion from a first position, in which fluid is sealed within said female
8 coupler, and a second position, in which fluid can exit said female coupler through said at
9 least one groove section, said interior portion including a main cavity, opening towards
10 said housing forward end, and an internal valve seat;

11 a poppet valve slidably received within said interior portion and spring-biased
12 forwardly against said valve seat to normally prevent fluid flow through said interior
13 portion, said poppet valve including a valve seal portion, and a forward projection
14 adapted to engage a check valve in said male coupler when said male coupler is received
15 in said exterior portion; and

16 a generally annular piston disposed and slidably received within said exterior
17 portion, said piston including a tubular main portion, a radially enlarged annular end
18 portion and a central bore for fluid flow, said tubular main portion being disposed and
19 slidably received within said interior portion and having an outer surface in sealing
20 contact with the inner surface of said interior portion, said radially enlarged end portion
21 engaging said interior portion, when moved axially to assist in moving said poppet valve
22 axially against excessive pressures in said male coupler.

1 10. The female coupling as in claim 9 wherein said interior portion includes a body
2 and a seal gland which houses a peripheral seal that is axially spaced from said at least
3 one groove section in said exterior portion, when in said interior portion first position,

4 and axially aligned with said at least one groove, when in said interior portion second
5 position.

1 11. The female coupling as in claim 10 wherein said peripheral seal is balanced and
2 resides in an external groove of said seal gland, said piston radially enlarged end portion
3 having a balanced seal residing in a circumferential groove in its external surface, and
4 said exterior portion having a balanced seal residing in a circumferential groove located
5 in its interior surface.

1 12. The female coupling as in claim 9 further including a sleeve disposed within said
2 interior portion and axially movable relative to said interior portion from a locked
3 position to an unlocked position with said interior portion, said sleeve having an internal
4 bore with an open forward end.

1 13. The female coupling as in claim 12 wherein said poppet valve has a rearward
2 tubular portion nested within said sleeve and having an outside diameter slightly less than
3 the inside diameter of said sleeve.

1 14. The female coupling as in claim 9 wherein said poppet valve further includes a
2 main cavity opening towards said exterior portion forward end for receiving a pressure
3 relief valve fixedly positioned within said poppet valve main cavity, said relief valve
4 having a pressure relief pin located at its front axial end, adapted to contact said male
5 coupler check valve and relieve pressure within said female coupler when said interior
6 portion is in said first position and prior to said forward projection engagement with said
7 male coupler.

1 15. A female coupler used as a fluid connector, comprising:
2 an exterior portion having an internal bore with an open forward end adapted to
3 receive a male coupler, a flow port for supplying pressurized fluid to the internal bore, an

4 internal surface with at least one groove section and at least one outlet passage through
5 said exterior portion for fluid communication with said at least one groove section;

6 an interior portion disposed within said internal bore and axially movable within
7 said exterior portion from a first position, in which fluid is sealed within said female
8 coupler, and a second position, in which fluid can exit said female coupler through said at
9 least one groove section, said interior portion including a main cavity opening towards
10 said exterior portion forward end and an internal valve seat; and

11 a poppet valve slidably received within said interior portion and spring-biased
12 forwardly against said valve seat to normally prevent fluid flow through said interior
13 portion, said poppet valve including a valve seal portion, a forward projection adapted to
14 engage a check valve in said male coupler when said male coupler is received in said
15 exterior portion.

1 16. The female coupling as in claim 15 wherein said interior portion includes a body
2 and a seal gland, said seal gland housing a peripheral seal that is axially spaced from said
3 at least one groove section in said interior portion first position and axially aligned with
4 said at least one groove section in said interior portion second position.

1 17. The female coupling as in claim 15 further including a generally tubular sleeve,
2 disposed within said interior portion, and axially movable, relative to said interior
3 portion, from a locked position to an unlocked position with said interior portion, said
4 sleeve having an internal bore with an open forward end.

1 18. The female coupling as in claim 17 wherein said poppet valve further includes a
2 rearward tubular portion which is received within said sleeve and has an outside diameter
3 slightly less than the inside diameter of said sleeve.

1 19. The female coupling as in claim 18 wherein said sleeve has an internal shoulder
2 for limiting the axial movement of said poppet valve.

1 20. The female coupling as in claim 15 wherein the interface between said exterior
2 portion and said interior portion includes a plurality of spaced grooves, within said
3 groove portion, said interface further including a plurality of balanced seals for preventing
4 leakage of the pressurized fluid between said exterior portion and said interior portion.

1 21. The female coupling as in claim 16 wherein said seal gland further includes a first
2 balanced seal residing in a circumferential groove in the rear external surface thereof, said
3 peripheral seal is balanced and resides in a circumferential groove in the front external
4 surface thereof, said exterior portion including a balanced seal residing in a
5 circumferential groove located in the interior surface thereof.

1 22. The female coupling as in claim 21 wherein said poppet valve is held against said
2 internal valve seat by a spring, residing within said poppet valve, when said female
3 coupling is fully pressurized and not in contact with said male coupler.